

1961

The Bobbin and Beaker Vol. 18 No. 4

Clemson University

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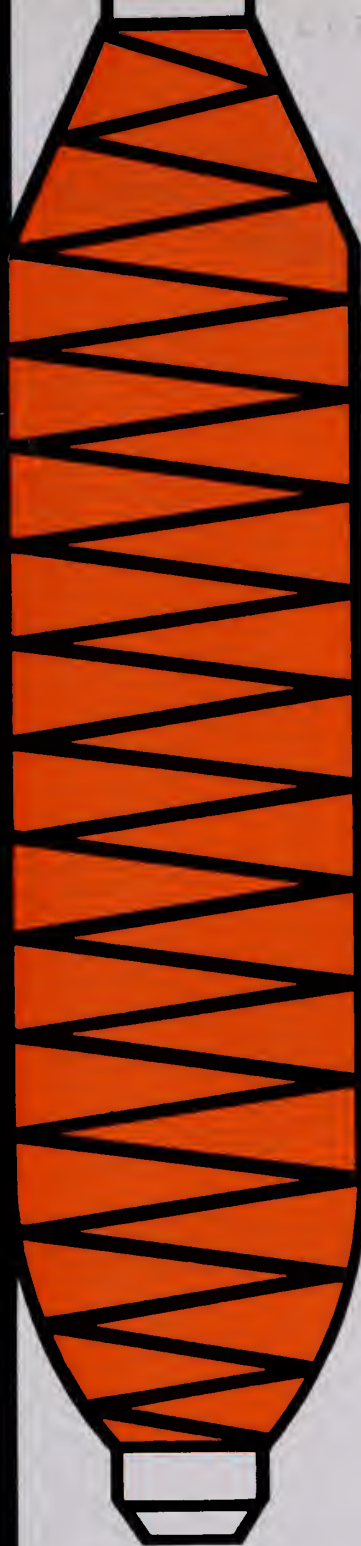
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CLEMSON COLLEGE

SUMMER ISSUE

1961

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THE Bobbin & Beaker

Official Student Publication
Clemson Textile School

VOL. 18

SUMMER ISSUE 1961

NO. 4

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from the Editor . .

that makes paper possible. This article is the first in a series, in which later issues will carry a more detailed outline of a specific type of paper machine felt.

Again, a new type of article appears in the form of a report by Senator Olin D. Johnston. Here, the Senator gives his views on the foreign trade problem and the effect the new administration will have on the textile industry. At this point, may I quote part of our policy: "The views and opinions expressed in all guest articles are those of the writers themselves, and must not be construed to necessarily represent the views and opinions of the Editors of this magazine or of the Faculty of the Clemson College School of Textiles."

From requests of many Clemson Alumni, a new column has been started. We hope "Alumni News" will also interest others besides Clemson graduates. The staff now wishes to extend a plea to all Clemson Textile graduates to please send in their name and address to us so we can continue this column. I'm sure you realize the almost impossible task of contacting our graduates of years gone by. Your friends and fellow classmates want to know about you!

Of interest in the textile chemistry field is Dr. Goldemberg's article. We feel that there are several ideas presented that have a slightly different slant.

The staff wishes to extend a hearty "Thanks" to all of our writers for our Summer Issue. We hope that our readers have gained both enjoyment and information from our first publication. —R. E. W

To the faithful reader of this magazine, several changes may be apparent to him. The new 1961-62 staff hopes that these changes are for the best. At this time the staff wishes to extend to each and every reader an invitation to submit suggestions on any particular phase of our publication. We are at all times open for suggestions, concerning the type of material you want to read. This is **your** magazine, and the staff wants to make it as enjoyable and educational as possible. Let us know what you like!

One of the several different types of articles is a short explanation on the basic fundamentals of paper machine felts. It is felt by the staff that many of our readers certainly realize the importance of paper but are not fully acquainted with the product of the felt



The 1961-62 Bobbin and Beaker staff seated from left to right: Crawford Love, Circulation Manager; Barry Barrineau, Managing Editor; Robert Wall, Editor; Charlie Hagood, Advertising Manager; Norman Guthrie, Business Manager.

Our Mutual Problem

By

Senator Olin D. Johnston (D. S. C.)

In 1960 imports of cotton yarn jumped to 14 million pounds from less than one million pounds in 1958. Imports of cotton cloth tripled, synthetic fiber fabric imports doubled, and apparel imports are up 70%. During the last 10 years over 400,000 jobs have been lost in the textile industry. In North and South Carolina alone 74 mills have been forced to close their doors.

The textile industry is in dire straits, and I appreciate this opportunity to express my views on our textile problems and their solution to a magazine whose subscribers have sufficient background to understand our dilemma. As for myself, I first started work in the textile industry as a sweeper in 1907. I subsequently worked in both the spinning room and the weaving shop of cotton mills for 10 years.

One of the first pieces of legislation I introduced and saw passed as a young State legislator was a bill to improve sanitary conditions in the mill villages. Since this early date I have done everything in my power to help the textile industry and the workers that derive their livelihood from the industry. During the second World War, the textile industry, like most others, thrived. However, shortly after the war ended, there was a concerted effort, principally by our State Department, to appropriate hundreds of millions of dollars to rebuild the Japanese textile industry. Along with this went rights to U. S.-improved machinery and techniques. I opposed this action from its inception and warned that we would be using American money to build Japanese industries to compete with our own. With their cheap labor they obviously could cut into our world markets.

Not only were my warnings unheeded but the various agencies of our Government made large cash grants and gave sanctions to other countries to build up textile industries in direct competition with our own. In the matter of protecting our domestic market from these foreign competitors, our State Department again prevailed and adequate protection was denied to our industry. Consequently not only did these competing countries capture a large percentage of our foreign sales but they cut severely into our domestic market.

The trend should have been evident to anyone who could see, but in the early years I was virtually a lone voice in the wilderness. During that 10-year period when I sought assistance for the textile indus-

Olin D. Johnston, now serving in his third term as U. S. Senator from S. C., has served in various public offices since 1922. After serving in World War I, he went to school at Wofford and later to law school at the University of S. C. He served for several years in the State House of Representatives. In 1934 he was elected Governor of South Carolina.

In 1944 Senator Johnston was elected to serve in the United States Senate. He served again in 1950 and 1956. He is now the 14th ranking Senator. At present he is Chairman of Committee on Post Office and Civil Service, member of Agriculture Committee, Ex-Officio member of Senate Appropriations Committee, and member of both the Judiciary and Steering Committee of the Senate.

try, many voices were quieted by State Department assertions that we had to have trade with Japan, to rebuild her economy, and we must import so that we could in turn export to other countries.

I have never been against trade with foreign countries. I have merely been against completely dropping all trade protection. Such action encourages foreign countries to flood our markets with low-priced goods made with cheap labor working under conditions that would be illegal in this country. I know we have to trade with others, but we don't have to allow them free access to **our markets** to such an extent that our industry will be wiped out.

It was pointed out to the Senate subcommittee studying this problem that if the figures illustrating the decline of the textile industry from 1948 to date are projected ahead, the industry will be completely finished in less than five years. I repeat, according to these figures, if they are projected ahead, there will not be one yard of cotton, manmade fiber, or woolen cloth produced in this country five years from now.

Bear in mind, please, that I am speaking of the end of an industry that has been declared second only to steel in importance as a defense industry by the Department of Defense. Bear in mind also that I am speaking of an industry that hires almost 1,000,000 workers and directly affects the garment industry, which employs over 1,000,000 additional workers. We have in these two industries alone 2,200,000 potentially unemployed if we allow present trends to continue. This does not take into account wool and cotton producers, etc., who have a direct stake in the continuance of a strong, vigorous textile industry.

I would further like to point out that this is not a problem local to the South only or to New England. There are some 8,000 textile plants scattered through

44 states across this great land of ours. Happily, their representatives in Congress are beginning to raise their voices against the continued decimation of America's oldest industry. Fortunately, we are beginning to pick up allies in our struggle for fair play.

Gloomy as the present situation is, though, I have reason to hope for a brighter future. Before I go into what we need in the way of relief for the industry and our possibilities for getting it, I wish to make one point just as clear as possible. The textile industry is not asking for government intervention or subsidies. All it asks is that we insist other countries observe substantially the same rules of conduct that are required of our own industry. Since the government to a large extent sets up the "ground rules," the government should apply them alike to all.

Our domestic producers must pay six cents a pound more for cotton than the amount paid for the same cotton by the foreign competition. This amounts to over \$30 a bale subsidy to foreign competitors by **our own government**. This, of course, represents the difference between the domestic price of cotton and the world price. Since cotton cost equals approximately 50% of the total cost of the finished textile product, it is readily apparent that our producers are operating at a big cost disadvantage.

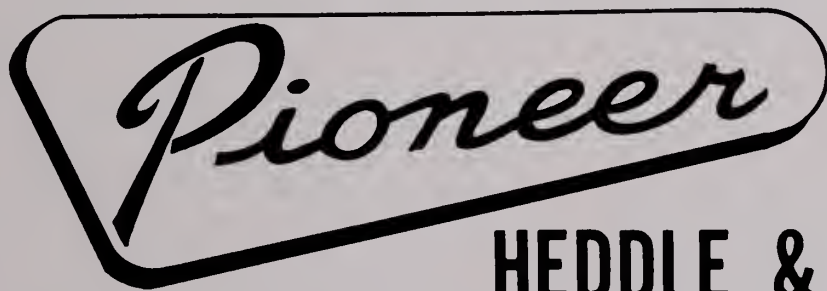
In addition, the average textile worker in the United States makes approximately \$1.71 an hour. In comparison Japanese workers get around 25¢ an

hour, and those working for our competition in Great Britain average only around 54¢ an hour. We cannot afford to permit continued importation of products made by slave labor which will certainly put our own mills out of business and cast our textile employees out of work. To glibly suggest that our textile industry should be able to overcome this great disadvantage by plant modernization and superior techniques which, at best, constitute only 20% of the cost of textile production is patently ridiculous and certainly is a callous attitude towards our working people. There is the added disadvantage that any modernization undertaken by us could be duplicated by foreign corporations at half the cost to American mills.

Our textile industry has been doing an excellent job at holding down prices. The price of textiles at the mill level is less than it was during the 1947-1949 period, while other industrial prices have gone up on an average of about 25%. It should be obvious to even the casual observer that the combined forces of cheap cotton and cheap labor are just too much for the American industry to combat.

Even when this realization has dawned on various government agencies in the past, however, no relief has been granted. The usual argument against granting relief, as I have pointed out, is that foreign relations considerations override the domestic diffi-

(Continued on page 12)



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PAPER MACHINE FELTS

By
David D. Sanderson

Paper making in the United States began in 1728, but the early textile felt makers were unable to produce an endless felt to convey the paper through its manufacturing processes that would equal the quality of European felts. So, for many years most felts were imported from Europe.

Albany Felt Company, the youngest of American paper machine felt manufacturers, was established in 1895. Today, after 66 years of operation, Albany Felt is known as the World's Largest Manufacturer of Paper Machine Felts and Industrial Fabrics with six plants employing about 1700 persons. These plants are located in Albany, New York; St. Stephen, South Carolina; North Monmouth, Maine; Hoosick Falls, New York; Cowansville, Quebec, Canada; and Cuautitlan, Mexico.

While Albany Felt was established to make paper machine felts, operations were gradually expanded to include the manufacture of a diversified line of woven industrial fabrics including sanforizing blankets, slasher cloth, slasher jackets, card clothing foundation cloth, lapping cloth, filter cloth, dust bags and other special fabrics made for the tanning industry, printing and lithographing operations and sporting goods manufacturers.

The St. Stephen plant completed in 1956 was the first in the South to perform all operations in the manufacture of paper machine felts. The shipping of the first papermaker's felt to be completely manufactured in the South coincided with the official dedication ceremonies on May 12, 1956. The plant, constructed and equipped at an estimated total cost of \$2,500,000, is located on a 117 acre site on the outskirts of St. Stephen, between Lake Moultrie and the Santee River, 45 miles from Charleston. Plans have been announced recently to construct an additional 33,000 square feet to the present plant.

A papermaker's felt is a wide woven fabric usually made of wool and finished into the form of an endless belt used on the papermaking machine to carry the pulp or newly formed sheet of paper or paper board. The felt traveling on the machine at speeds up to 1200 feet per minute must be porous enough to drain excess water, strong enough to drive the machine

Mr. Sanderson is Plant Industrial Engineer of the Albany Felt Company's St. Stephen, South Carolina plant. He is a native of Birmingham, Alabama, and graduated from Auburn University in Industrial Management. A member of the American Institute of Industrial Engineers, Mr. Sanderson also, has been employed by the American Enka Corporation and the American Bosch Corporation prior to joining the Albany Felt Company in 1957.

rolls and of suitable texture to impart the desired finish to the paper. Felts for some types of modern machines may measure 340 inches or more in width and some, used in the manufacture of paper board, are made in lengths nearly 300 feet long.

A paper machine felt is produced initially much the same as most woolen fabrics. The yarn making processes consist of scouring, blending, carding and spinning. Carding equipment consists of two 84 inch Davis and Furber cards and several Model F, Davis and Furber Spinning Frames. More than 500 different yarns are made with this equipment which necessitates a considerably smaller average batch size than the normal textile operations. Throughout the yarn making process yarn weights, twist and other characteristics are carefully controlled to provide the most consistent yarn possible from the woolen raw material. While the basic raw material is wool, occasionally synthetics are blended with wool to provide maximum felt life and maximum paper production during the felt life on the paper machine.

The weaving operation, if the felt is very fine and closely woven, may require as much as 144 hours of weaving. To keep the flow of some 3000 styles and sizes of felts constantly moving through production, looms range in size up to 650 inches in width. Looms exceeding 92 inches are rare in an ordinary woolen mill but necessary for uniform weaving of large felts to clothe the larger paper machines in operation today.

In a delicate process, felts that are too long or too fine to be woven endless (some felts can actually be woven tubular or endless in the loom) are joined by hand. Joining of some felts takes 32 to 48 hours. This is so skillfully done that only an expert can detect

and difference from a felt that was originally woven endless.

The felt is “fulled” (thickened and compacted) to size in a rotary fulling machine. Mechanical pressures on the wool, with soap and water as a lubricant, cause an interlocking of the fibers which is called “felting” or fulling. The damp felt passes through an adjustable “throat” and between heavily weighted rolls. At regular intervals, the operator checks the length of the felt while it is still in the rotary machine and records the figures for comparison with the fulling records of previous felts of similar specifications.

After being washed under controlled conditions, the felt is napped and dried on steam heated dryers with the felt stretched out between huge steel rolls under exacting tension. Also at this point, the length and width are checked again to make certain that the felt will run correctly and exactly for the customer for which it was assigned and engineered.

Each area of every felt on both sides is inspected for any defect and should any be found, the felt is rejected. Since there is no use for “Second or Damaged Felts”, it is imperative that only perfect felts are shipped to customers.

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N. T. M. S. Highlights

By
John W. Mathis, Secretary, TM '62

On the first and last Tuesday of every month there is a room in Sirrine Hall that comes to life as some fifteen to twenty students assemble to have their monthly meeting of the National Textile Manufacturing Society. The purpose is to bring about a more intimate relationship between the textile industry and the under-graduates of the textile school.

With the coming year to look forward to, the N.T.M.S. is keeping pace with time. On April 28, 1961, the N.T.M.S. held its election for next year's officers. The results were fascinating with only one or two votes different in some cases. Mickey L. Creach, a rising senior, majoring in Textile Science, from Hartsville, S. C., was elected president of the club. Robert E. Wall, also a rising senior from Charleston Heights, S. C., was elected to the office of vice-president. The other officers elected were: John W. Mathis, secretary; Donald R. Langley, treasurer; and Hall Turner for publicity director.

At present the N.T.M.S. is planning a field trip to one of the South's many textile industries. With the

new officers there is very little doubt that the N.T.-M.S. is going to grow and become one of the predominant societies on campus.



1961-62 NTMS Officers seated left to right: Seated: Robert Wall, Vice President; Mickey Creech, President; John Mathis, Secretary; Standing: Donald Langley, Treasurer; and Hall Turner, Publicity Director.

Alumni News

Textile Chemistry

Cranford, Reginald T., Pineville, N. C. Reginald will enter the Army in March, 1962, at Fort Benning, Georgia, for six months. Afterwards, he will work as supervisory trainee for Springs Cotton Mill, Grace Bleachery, Lancaster, S. C.

Hinson, Roger A., Lancaster, S. C. Roger has made no definite plans.

Kernels, Bobby R., Anderson, S. C. Bobby will work for Burlington in Taylors, S. C. He will enter management training and will then be assigned to the Dye House.

Neal, Bobby L., Rock Hill, S. C. Bobby will work for Burlington in Altavista, Va. He will enter management training and then be assigned to the finishing department of the fiberglass plant.

Townsend, Francis A., Jr., Aiken, S. C. Francis is going to work for J. P. Stevens at Delta Finishing, Cheraw, S. C.

Textile Engineering

Ariail, Thomas M., Sevierville, Tenn. Tommy is going to work for Mayfair Mills in Arcadia, S. C.

Textile Management

Adams, Alvin A., Union, S. C. Aubrey is going to enter the I. E. Training Program at Monarch Mills in Union, S. C., upon graduation.

Anderson, William T., Greenwood, S. C. William will be in production training for Deering-Milliken in Gaffney or Spartanburg, S. C.

Arnold, David A., Aiken, S. C. David is planning to work for Burlington at Poe Mill in Greenville, S. C. He will be in production management training.

Buchanan, Kenneth R., La France, S. C. Kenneth is going to do graduate work at the University of South Carolina.

Catoe, James C., Heath Springs, S. C. James is going to work at Springs Cotton Mills, Lancaster, S. C.

Eubanks, Charles E., Lyman, S. C. Charles is going to enter the Army after graduation.

Francis, Steve C., Grover, N. C. Steve plans to enter the service for six months upon graduation. Afterwards, he will go into sales for J. P. Stevens & Co., at Wallace, N. C.

Freeman, Charles L., Rutherfordton, N. C. Charles will work for Deering-Milliken.

Greer, Donald R., Spartanburg, S. C. Don will accept an Army commission in the Artillery branch in Germany. Afterwards, he will be attached to Deering-Milliken's New York Sales Office.

Holstein, Milledge J., Monetta, S. C. Jeff plans to go into the Army for six months and then would like a position in sales.

Hughes, Philip L., Hickory, N. C. Philip will work for Burlington Industries, Cramerton Plant, Cramerton, N. C., in the Fabric Design Department.

Roddey, Robert S., Greenwood, S. C. Bob will work for Self Mills.

Rodgers, Archie D., III, Georgetown, S. C. David plans to make the Army his career. He will be assigned to Fort Campbell, Kentucky, in Airborne Artillery.

Saunders, Steve J., Rock Hill, S. C. Steve plans to go to work with Dan River Mills, Danville, Virginia, after 6 months active duty with Army. Plans to go into Production at Danville.

Simril, Robert M., Clemson, S. C. Robert plans to work in the fabric development department of the Riegel Textile Corp. in Ware Shoals, S. C.

Swart, John B., Caracas, Venezuela. John will work for Tocone Industria Textil, in Caracas, Venezuela, in the Quality control department.

Todd, John D., Spartanburg, S. C. John has no definite plans, but hopes to work in planning and design.

Wellmaker, James A., Ninety Six, S. C. James will work for Self Mills, in Production, in Greenwood, S. C.

White, John T., Jr., Anderson, S. C. John has worked for Woodside in the Weaving and Design department for the past 9 years and will continue to do so upon graduation.

Wingo, John C., Union, S. C. John will work for Gerrish Milliken Mill in Pendleton, S. C., in production.

Young, W. Harral, Jr., Sumter, S. C. Harral will first go on a 6 months training program for Burlington, Pacific Division, Lexington, N. C. He then expects to work in Yarn Manufacturing.

Textile Manufacturing

Carpenter, Dalton O., Jr., stationed in New York. Major Carpenter will go to England upon completion of his degree to continue his career in the Army.

Howe, Charles E., Hemlock Station, Chester, S. C. Charles will go first on a training program at Springs Cotton Mills, White Plant, Fort Mill, S. C. Afterwards, he will go into production.

Stevenson, Robert F., Greenwood, S. C. Robert plans to work in Cost Department of Greenwood Mills.

Stone, Franklin R., Buffalo, S. C. Franklin is undecided as to his future plans.

Textile Science

Adams, James Leander, Jr., Spartanburg, S. C. James has received a deferment from the Army to attend Harvard Graduate School.

Hunter, Orren F., Sr., Clemson, S. C. Frank will enter Institute of Textile Technology in Charlottesville, Virginia. Upon completion of his masters degree, he would like to work in production or research and development.

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The Dean says...

(Professor Thomas A. Campbell is pinch-hitting for the Dean in this issue.)

On a recent trip to New York to attend the sixteenth Annual Society for the Advancement of Management and the American Society of Mechanical Engineers, Engineering Management Conference, I had the privilege of visiting the Sales Office of the J. P. Stevens Company located in the Stevens Building on Broadway at 41st Street. This visit to the J. P. Stevens offices was on April 5th and the morning of April 7th. Mr. Marshall Palmer, Vice President of Sales, took me on a tour of the various departments of which there are too many to enumerate at this time. This visit was a most valuable experience. I had no conception of the number of people and the amount of floor space that was required to handle sales, advertising, billing, etc. There are approximately 1500 people employed and about one-third are salesmen. J. P. Stevens has several other sales offices in the United States manned by a few salesmen and office personnel.

During the afternoon I had the pleasure of observing the artists and designers at work creating new designs.

While in the Cotton Dress Goods Division, I saw three of my former students; Mr. George Diamond, '51; Mr. R. S. Calabro, '53; and Mr. R. A. Gullucci, '54. Mr. Gullucci is a salesman in this department and he asked me to accompany him on a selling trip to one of his customers, a cutter, in the City. In my observation of the cutter, it was evident that he was most interested in the hand, the appearance and **the price** of the cloth rather than the technical aspects of it.

The sales personnel through marketing research determine the trend of new designs and patterns accepted by the buyers and in turn notify the manufacturers.

On Friday morning I visited the Utica-Mohawk Sales Division and discovered that their sales policies differed greatly from the other departments. They

were selling finished goods, such as sheets and pillow cases, direct to the retail trade.

In talking with some of the top men of this organization, I gathered that they would like to have more men from the southern textile schools to enter the selling and merchandising field.

The Annual Engineering, Management Conference was held April 6th and 7th at the Hotel Statler in New York City. This is the most important meeting of S.A.M. and S.M.E. for the year. The attendance is usually between twelve and fifteen hundred, representing all levels of management and engineering personnel in industry, commerce, government and education.

There are two large meeting rooms on the same floor with two speakers for the morning meeting and the afternoon meeting; also, two rooms for special workshops each day. This is fine because it allows members to hear speakers of their choice or attend the workshop. There are speakers for the luncheon meetings and a speaker for the dinner meeting on Thursday evening.

The members and visitors have a part through a questionnaire in the selection of the speakers and their subjects for the next annual meeting.

Our Mutual Problem

(Continued from page 7)

culties. For years I have tried to convince those controlling these decision that America must remain strong industrially first and, secondly, we must help our friends to develop. They have insisted on giving primary consideration to what other countries will think of us, or to try and buy friendship even at the expense of our own domestic industry. In many instances the State Department has become a state of foreign-mindedness.

Have other countries reciprocated this generosity? They have not! At this writing there are 52 countries that have a virtual embargo on our cotton textile goods, and 22 others that have substantial restrictions against them. In return we have systematically reduced our tariffs until we rank next to Canada as a free market, and every foreign textile manufacturer in the world is greedily eyeing the American market. Only a fool would think our U. S. market can support the textile industry of the world

(Continued on page 18)

Outstanding Seniors . . .



Bobby L. Neal

Bob Neal is a Textile Chemistry major from Rock Hill, South Carolina; he is twenty-two years old and is married. Bob received honors the second semester of his junior year and the first semester of his senior year. During his junior and senior years he has held the Ciba Co., Inc. Scholarship.

While at Clemson, Bob has been a member of several organizations. They include two years in Phi Psi; three years in the AATCC—he is outgoing President; one year in the Council of Club Presidents; and one year in the Student Assembly.

Bob has worked three summers with Highland Park Manufacturing Co. and one summer with Celanese Fibers, both companies located in Rock Hill. When he graduates at the end of this semester he will be employed by Burlington Industries as a management trainee in fiberglass finishing at Alta Vista, Virginia.

Mitch Allen, a twenty-one year old Spartanburg, South Carolina, native, is a Textile Science major. He has had experience working in various departments of Beaumont Mills during several summers.



Mitchell D. Allen

Mitch graduates in January of 1962 so he does not have a definite job, but he hopes to remain in the South and work in production or planning.

He is enrolled in Army ROTC and hopes to be commissioned for six months in the Quartermaster's Corp immediately after his graduation.

Mitch was in the Pershing Rifles, and has been a member of Phi Psi for two years. He served as Senior Warden this year. Mitch received honors three times: first semester freshman, and first and second semesters his junior year.

By

Robert Ellis, TC '63

Steve Francis is a twenty-two year old Textile Management major from Blacksburg, South Carolina. He is unmarried and has no military plans so far.

Steve has done summer work with two companies: Minette Mills in Grover, North Carolina, and Gaffney Manufacturing Co., in Gaffney, South Carolina.

Steve has participated actively in several phases of the intramural sports program. He has been a member of Phi Psi for the past two years.

After his graduation in June, Steve will be employed by J. P. Stevens & Company, Inc., at Wallace, North Carolina, where he will work in production and sales.



Steve C. Francis

Progress in Textile Dyeing

By

Maurice Goldemberg

Textile Chemistry — Dyeing Department

School of Textiles

Clemson, S. C.

The textile industry is undergoing a revolutionary change under the impact of 3 main factors:

1. Growing awareness on the part of the consumer that better fabrics are getting increasingly available.
2. Increased tempo of scientific progress, in developing new dyeing concepts, and better dyes; this activity is interlaced with the eclosion of a host of new fibers and modifications of the older ones.
3. Automation.

A few examples of these factors are reviewed below:

1. **The Consumer:** This writer remembers the misfortune of a friend who went out for a stroll one day, wearing a stylish red silk tie bought in an exclusive shop, because he could afford the best; he was caught in a rain; the red dye bled mercilessly over his white shirt.

That was a generation ago. The term "washable" was already well known; stores were loaded with cotton "wash dresses", there was even talk of washable silk; but no one really expected washability or even cold water fastness from a beautiful silk fabric.

The victim knew the score well; he was the head dyer of a prominent silk dye-house.

Much progress took place since. The quality of the average textile is higher than ever before; we have labeling laws; informative labels often give us unequivocal guarantees of wash and wear quality.

Yet, when an average consumer purchases a well tailored suit, made of a fabric resembling a conventional worsted, he will hesitate to wash it, regardless of the label's assurances; he will rather have it dry cleaned.

Strange to say, some bold traders have taken a calculated risk, based on this consumer psychology; a rather poor quality "wash and wear" was sold, on the

assumption that few people would launder the cloth, and only a few "cranks" would complain.

Obviously no money-back guarantee will ever repay the long range damage thus inflicted on a whole industry; if such merchandise is exported, the nation's good name suffers.

2. **Technological Progress:** If one looks back to the 1930's, it will be found that there was a "revolution" in those days: The development of formulation.

The art of dyeing and finishing was a hodge-podge of recipes, guarded jealously by each individual dyer and finisher. Formulation opened a new chapter in the dye-houses. From then on, each dyeing was conducted in a pre-determined way, with an accurate dye formula, recommended or even worked out by the laboratory chemist. Quality and efficiency were greatly improved and management could even know ahead of time the cost of processing a given yard of goods.

One could also visualize the gradual formation in each firm of a real library of shades and finishes, as a lasting monument to human progress.

But it was quickly found that formulas were rather short-lived in a fast changing world.

The 1930's witnessed also the coming of age of 2 man-made fibers: Viscose and cellulose acetate. They heralded the problems of the new textile age. The early fabrics had a gaudy glitter; dyeings were often skittery, with bare effects. The cellulose acetate was in fact hardly dyeable until a new dye method was evolved: instead of the usual water soluble dyes, the disperse dyes came up, nearly insoluble in water, but soluble in the fiber.

Other laboratory studies made possible in the 1940's the development of continuous vat dyeing methods: The Pad-Steam range and the Williams unit for cottons and rayons. Then the war speeded the introduction of Nylon 6.6, the first truly synthetic fiber. With it, came new problems: besides the uneven dyeings, there was the inability to get dark shades and the blocking of one dye by another.

Satisfactory explanations and remedies for these problems came only gradually, through improvements in the fiber and in the dyestuffs.

Recent Developments: The 1950's are characterized by the eclosion of many man-made fibers; then variants appear to extend the use or dyeing qualities of the original ones; or to replace them.



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I. The original studies of Dr. W. Carothers (DuPont) on **polyamides** produced the nylon 6.6; represented below in 1-a.

A close relative, Nylon #6, competes with it, based the German Perlon, given below in 1-b.

A more distant relative is the French Rilsan (Nylon 11). All are linear polymers, with different structures and physical properties: melting point, porosity, dye affinity.

II. The **1st acrylic** fibers were the Orlon #41 and #81, (DuPont); probably acrylonitrile homopolymers. The structure is represented in 1-c.

Orlon #41 was almost undyeable, until a new dyeing method came up, developed by Union Carbide for its own Dynel fiber: The Cuprous ion, which acts as a mordant for acid dyes, Orlon #41 is now replaced by copolymers, especially the Orlon #42, dyeable with basic dyes at normal atmospheric pressure; these dyeings are of excellent quality.

The Acrilan 1656 (Chemstrand Corp.) is another example of a copolymer of acrylonitrile and another constituent, possibly vinyl pyridine.

It has a variant, acrilan 16, with different dyeing characteristics. Graph I (1-f) illustrates how both can supplement each other in producing cross-dyeings of good fastness, when woven in the same fabric. This graph is taken from the Acrilan and Arcilan 16 dyeing manual, published by the Chemstrand Corp. Note: In Graph I: Dyeability of Acrilan #16 with basic dyes is largely unaffected by increased acidity while the dyeability of Acrilan #1656 drops drastically. With acid dyes, the dyeability of Acrilan #1656 increases with the acidity, while Acrilan #16 has no affinity for acid dyes.

A final example of Acrylics is the case of Zefran, (Dow Corp.), a nitrite alloy reported to contain in addition to acrylonitrile, minor amounts of vinyl pyrrolidone; it has an unusual dyeability with many classes of dyes, including vats and naphthols. However, the bright basic dyestuffs give dyeings of only moderate fastness to light and wash. In all cases above, the acrylonitrile is now copolymerized with

monomers capable of acting as bonding agents in dyeing: a) Acidic monomers introduce sulfonic or carboxylic groups, to react with basic dyes. b) Basic monomers introduce amino or pyridine groups, to react with acid and direct dyes. c) Non-ionizing monomers introduce vinyl acetate or acrylamide groups capable of forming complexes with disperse dyes.

III. Dacron was the **1st** polyester in this country, based on the British Terylene. Its structure can be seen in 1-d.

While it will accept disperse dyes like the cellulose acetate, its rate of dyeing is extremely low except above 100° C. at higher pressures. The introduction of carrier dyeing made normal pressure dyeings possible commercially.

The mechanism of carrier action has been subject to debate. It seems that, by penetrating the fibers, the carrier loosens the bonds between fiber molecules; the disperse dye can then replace the carrier on the fiber sites.

Here again, there is a copolymer Dacron #64 with acidic groups, enabling it to be dyed with basic dyes.

Against the modern synthetics, all based on linear polymers, it is good to recall the branched structure and various cross-linkages of wool, given below in a simplified form: (1-e)

This structure provides many sites for dyestuffs and explains the physical stability of the fiber.

Other Factors: The right polymer is not the only controlling factor in dye problems. A cationic-type lubricant on a fiber can change its dyeability. Finally, modern resin finishes actually modify the fibers and influence the choice of dyestuffs. Cotton is the best example of this development. The newer synthetics may see the same trend.

Theoretical Studies on Dyeing: The mechanism of dyeing of all fibers is subject to an intensive study. It is spurred by the need to fashion properly the newer fibers. This is a rather new field of study, based on a better knowledge of the structure of fibers,

natural and man-made, and of the nature of the solutions or dispersions of dyestuffs.

As an example: Vickerstaff (2) and Zollinger (3) studied 3 types of dye isotherms. See Graph II. (1-g)

1. The N type represents the actions of disperse dyes on acetate.

2. The L type represents the stoichiometric action of anionic (acid dyes) on silk, wool, nylon or vice versa, the action of basic (cationic) dyes on acrylonitrile.

3. The F type represents the action of direct dyes and leuco-vats on cellulose; here a purely physical affinity to a surface takes place, thru a Van der Waals effect.

It was also found that a simultaneous effect of 2 of the mechanisms can take place with some dyestuffs. Studies of this type act as a guiding light in the search for new, more satisfactory dyes.

Other studies lead to unusual developments: In the Thermosol process, dacron is now dyed in a continuous process, where the dyeing cycle is reduced from a few hours to a few minutes.

The Monfort reactor (4) uses a pressure device to dye continuously a variety of fibers.

The reactive dyes for Cellulose were introduced 5 years ago; here a high grade dyeing may be produced in a continuous process of pad-steam. It can even be applied with common resins in the finishing operation.

Still another simultaneous dyeing and finishing operation is possible in pigmented emulsion dyeing, quite useful in blends.

Automation: The Electro set process (5) represents an approach to automation in Nylon dyeing. It has been developed to scour, dye at high temperatures, finish, set, and dry nylon hosiery in one continuous operation. It uses an automatic photo-electric control of the color of the dye bath. The shade of the finished product is reported to be acceptable even if it does not control directly the dyestuff feed.

Conclusion: This rapid survey of modern dyeing accomplishments emphasizes the growing complexity of this industry.

A. Rapid technological progress takes place in this country as well as in Europe, Japan, etc.

B. It is remarkable to note that we are only emerging from the empirical methods of the past; we are beginning to know how to tailor a new fiber to make it dyeable with known dyes; vice versa, new and better dyes are made for the existing fibers.

C. Some of our oldest fibers may remain, more or less modified, while some of the newer "miracle" fibers are disappearing already; much better fiber will undoubtedly be produced.

D. Textile progress is the result of a vast cooperative effort, based on a sound theoretical knowledge of fibers and dyes. Quality at a price, is the surest key to lasting success.

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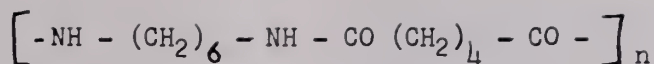
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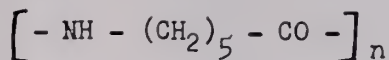
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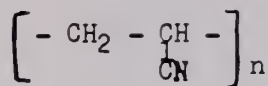
1a - Nylon 66



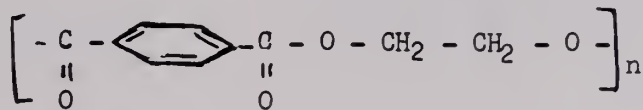
1b - Nylon 6



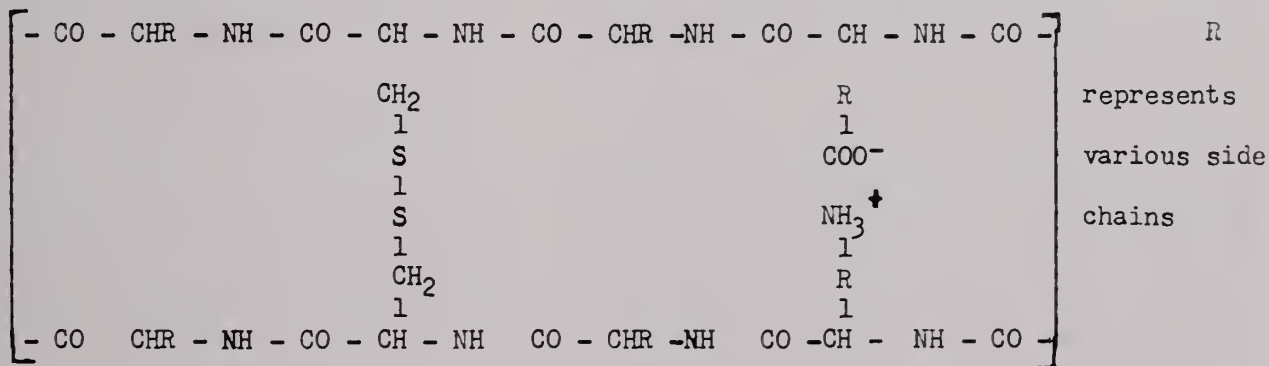
1c - Orlon



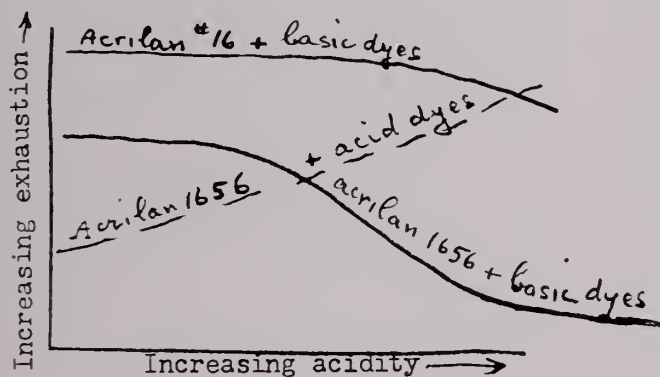
1d - Dacron



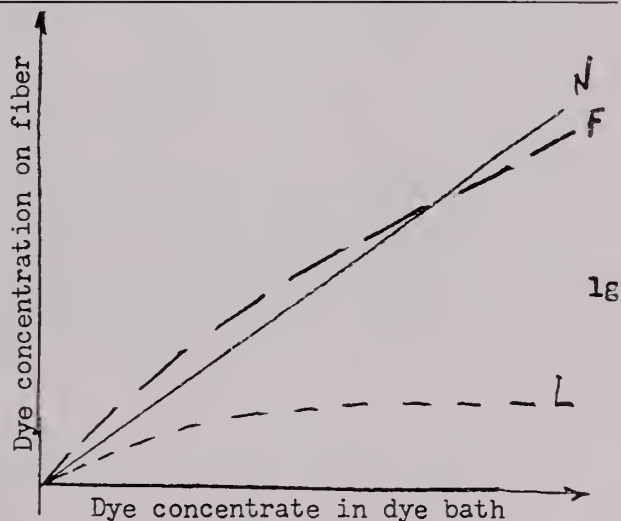
1e



1f



Graph I



Graph II

References:

1. 1-a to 1-e: Structural formulas.
2. 1-f and 1-g: Graphs.
3. Vickerstaff — Physical Chemistry of Dyeing — 1954 edition
4. Dr. Zollinger — Palette #6 — Winter 1960
5. J. Roehl — American Dyesuff Reporter — May 16, 1960
6. J. S. Christie — Automatic Color Control, American Dyestuff Reporter — April 17, 1961

Background of Author:

Mr. Maurice Goldemberg was born in Paris, France. Chemical Engineering degree, National School of Chemistry, Paris. M.S., Sorbonne, University of Paris.

Industrial experience:

Laboratory Chemist in Sunbury Converting Works, Sunbury, Pennsylvania.

Laboratory Chemist, Plant Chemist, and Supervisor of Silk Weighting, United Piece Dye Works, Lodi, New Jersey.

Director of Dye-house, United Piece Dye Works, Charleston, S. C.

Mr. Goldemberg is now Associate Textile Chemist, Clemson College.

Our Mutual Problem

(Continued from page 12)

without destroying our own industry and throwing an additional one to two million people out of work! When we start putting millions of Americans out of work, the great American buyer everyone is eyeing so eagerly disappears and we have instead the great American bread line. There is no reason to wait until this happens and we have to try to restore these people to jobs—when we can prevent this happening very easily.

What we need is recognized by anyone who has any knowledge of the textile industry. What we need, as recognized by owners, managers, labor, suppliers and the Senate subcommittee alike, are realistic and mandatory quotas by country and category.

Two years ago after extensive hearings the Senate subcommittee recommended strongly that such quotas be established. Just as my earlier requests had gone unheeded, so were the recommendations of the subcommittee unheeded. The previous administration maintained that existing legislation and directives offered relief through the "peril point" and "escape clause" provisions. These provisions have proved ineffective because they are too cumbersome and time-consuming, and because the previous administration refused to apply them.

I have reason to believe, however, that under our new administration we will at last find some of the relief from these low-cost goods that we have long been seeking. Shortly after the inauguration of President Kennedy I discussed this problem with him at length. I am confident he understands it and is realistic about the inherent dangers of continuing our past course. He has appointed a Cabinet-level committee consisting of the Secretaries of Labor, Agriculture, Commerce, and Treasury and an Under Secretary of State to study the textile problem and suggest action. I was happy to see the makeup of this committee, and I have contacted every member.

The Secretary of Labor should have foremost in his mind the effect of the deterioration of our textile industry on the 2,000,000 textile and apparel workers.

The Secretary of Agriculture will be concerned with the damaging impact of imports on our cotton and wool producers.

The Secretary of Commerce can't help but be appalled at the destruction of one of our oldest and largest industries, and one with which he had direct contact as a former Governor of North Carolina.

It should also be obvious to the Secretary of the

Treasury that our country stands to lose fantastic sums of money by eliminating ourselves as a textile manufacturer and becoming merely a consumer of textiles and an exporter of dollars.

No longer will the decision on quotas be made solely by those who think first of foreign countries and, secondly, of our own people. Instead, the President has appointed a representative committee that should consider every aspect of our dilemma.

When we were originally dealing only with the matter of textile imports from one country, our people could protect themselves fairly well, but today with Hong Kong, Japan, Great Britain, Egypt, Portugal, Spain, India, France, Korea, Formosa, and Pakistan, as well as dozens of others flooding the markets of the world, we must establish a realistic mandatory quota system in order to protect the standard of living of our working people.

In addition, I hope that the International Cooperation Administration will take a more realistic view and purchase more of the textiles it buys from our own people. During the last administration only a very small percentage of ICA purchases were bought at home. For instance, during the fiscal year ending June 30, 1960, the ICA spent 44.3 million dollars for textiles and only 4.5 million dollars, or 10%, was spent in the United States.

This figure becomes fantastic when you consider it in conjunction with our gold shortage, our efforts to restore the balance of payments, our high unemployment rate during this period, and the big campaign to "Buy American." In addition, our unemployment was at an all-time high and thousands were laid off from work at our textile mills.

There will certainly be a more realistic evaluation made in the future under our new administration, and I expect to see increased purchases of American textiles by the ICA. I also look forward to seeing closer relationship between our officials overseas who have knowledge of potential purchasers and our people at home who have the finest textiles in the world for sale. In the past, communication between our overseas representatives and our domestic producers has been almost nonexistent.

In short, I hope for a completely new attitude toward our textile industry. The indications are that under the new administration we can expect a far better deal. I have been in touch with both the President and his committee on textiles, and I intend to stay in touch with them until we get the relief we deserve.

I, for one, am filled with hope for the first time in over eight years.

Latest Phi Psi News

By

Buddy Holly, Editor of Phi Psi, TM '62

On May 1, 1961, Iota Chapter of Phi Psi awarded an honorary membership at a banquet held at the Clemson House. This honor went to Mr. Frederick B. Dent of Spartanburg, S. C. Mr. Dent is currently President of Mayfair Mills, Arcadia, S. C. Mr. Dent, a graduate of Yale University, is also a trustee of the Serrine Foundation and of the Institute of Textile Technology. Congratulations to Mr. Dent.

As of February, 1961, we have also invited four new members to join us. They are Spurgeon Brian, a Textile Science major from Wellford; Gene Crocker, a Textile Chemistry major from Enoree; Robert Ellis, a Textile Chemistry major from Huntersville, N. C.; and Archibald "Mac" Calhoun, a Textile Management major from Clio. Congratulations are also in line for these four.

This spring the Iota Chapter is sponsoring a softball team in the Spring Intra-Murals for the first time in many years. There is great interest shown by the members in this team which, at the present, is on the top in its respective league. Win, lose, or draw, Phi Psi will make a good showing for itself in this year's intra-mural softball competition.

On May 7 a social was held at the Hilltop Supper Club in Greenville. It was attended by most of the members, their wives or dates, and Mr. and Mrs. David E. Gentry. Everyone seemed to enjoy the dining, dancing, and fellowship. Iota Chapter will not soon forget the Hilltop's chief musician, "Crazy Horse."

Iota Chapter will lose the following brothers via graduation in June: A. Aubry Adams, James L. Adams, Jr., Thomas M. Ariail, David A. Arnold, Kenneth R. Buchanan, Reginald T. Cranford, Charlie E. Eubanks, Steve C. Francis, Don R. Greer, Orren F.



1961-62 Phi Psi officers seated left to right: Crawford Love, Vice-President; Charlie Hagood, President; Gene Phillips, Secretary. Standing: David Beville, Junior Warden; Mitch Allen, Senior Warden; Tom Templeton, Treasurer.

Hunter, Bobby L. Neal, Archie D. Rodgers, John B. Swart, Francis A. Townsend, and W. Haral Young, Jr.

Among those planning to do graduate work are Brothers Adams, Buchanan, and Hunter. "Jay" Adams has received a fellowship to Harvard, while Frank Hunter has received a fellowship to the Institute of Textile Technology, Charlottesville, Virginia. Kenneth Buchanan plans to attend the University of South Carolina, Columbia, South Carolina. We all wish these men the best and feel sure that they will make the best.

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The T. C. Club Report

By

Jerry Byrd, Secretary

The T. C. Club has been on two field trips since the last report was made. One was a trip to Ware Shoals and the other trip took us to Greenwood. At Ware Shoals, we went through the Riegel Finishing Plant. After going through the printing and dyeing sections, we went through the roller engraving sections of the plant.



1961-62 A.A.T.C.C. officers standing left to right: Joe Belcher, Treasurer; Jerry Byrd, Secretary; Stan Rose, Vice-President; Gene Phillips, President.

After dinner, we went through the Chemstrand nylon plant in Greenwood. We saw how they start out with the flake and end with nylon yarn.

The T. C. Club also went through the Excelsior Finishing Plant at Pendleton.

The T. C. Club elected the following students as officers for the 1961-1962 school term: President, Gene Phillips; Vice-president, Stan Rose; Treasurer, Joe Belcher; and Secretary, Jerry Byrd.

TWENTY

New Scholarship Awards For 1961-62 Announced

Blackmon-Uhler Scholarship (\$250)—Robert C. Hartzog; Blackmon-Uhler Scholarship (250)—Gerald S. Rose, Camden; Chemstrand Scholarship (\$500)—John W. Mathis, Converse; *Ciba Scholarship (\$500)—David A. MacEwen, Greenville; Geigy Chemical Co., Scholarship (\$250)—Jerry Ned Pruitt, Duncan; Ben and Kitty Gossett Scholarship (\$300)—Jerry L. Witt, Saluda; David Jennings ('02) Memorial Scholarship (300)—Wm. E. Barrineau, Jr., Cades; Keever Starch Scholarship (\$400)—Lloyd E. Foster, Seneca; Owens Corning Fiberglas Scholarship (\$500)—Charles C. Haggood, Easley; Seydel-Woolley Scholarship (\$300)—Spurgeon B. Brian, Wellford; Sonoco Scholarship (\$500)—Russell H. Lawrimore, Mullins; Sonoco Scholarship (\$500)—George L. Harmon, Jr., Chesterfield; South Carolina Textile Manufacturers Association Scholarship (Special) (\$250)—Thomas W. Templeton, Greenwood.

*May be renewed for 1962-63.

P L E A S E !

Changed Address Lately?

Help us to keep our files up to date. Our sincere thanks to all of you who answered our appeal in the last issue. If you haven't answered, please fill in the form below and mail to:

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For the fourth summer the School of Textiles is offering a short course program for those in the Textile industry and related fields.

The first two courses, Yarn Manufacturing and Fabric Development, are especially recommended for the college graduates, other than textile school graduates, who will enter the industry this June. This program will serve them well, regardless of what phase of the industry they enter. It will be ideal for those entering a training program or for those going into the various staff fields. High school graduates will benefit.

COURSES

Yarn Manufacturing—Theory and Laboratory—Date Offered—June 12 or July 10, 1961

Fabric Development—Theory and Laboratory—Date Offered—July 11, 1961

Supervisor Development—Theory—Date Offered—June 12 or July 10, 1961

Quality Control—Theory—Date Offered—July 10, 1961

Motion and Time Study—Theory and Laboratory—Date Offered—June 12, 1961

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